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FLOOD INSURANCE STUDY

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TOWN OF JEFFERSON, MAINE
LINCOLN COUNTY

OCTOBER 18, 1988

Federal Emergency Management Agency

COMMUNITY NUMBER - 230085

ORIGINAL

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY
TOWN OF JEFFERSON, LINCOLN COUNTY, MAINE

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of Jefferson, Lincoln County, Maine, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by the U. S. Geological Survey (USGS) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 11. This work was completed in June 1987.

1.3 Coordination

Waterbodies requiring detailed study were identified at a meeting attended by representatives of the USGS, FEMA, and the Town of Jefferson in December 1984. During the course of the work by the USGS, flood elevations and flood boundaries were reviewed with community officials. An interim coordination meeting was held with Jefferson town officials in June 1987 to review the study in progress.

On November 18, 1987, the results of the work by the USGS were reviewed and accepted at a final coordination meeting attended by representatives of the USGS, FEMA, and the Town of Jefferson.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town of Jefferson, Lincoln County, Maine. The area of study is shown on the Vicinity Map (Figure 1).

The entire shorelines along Damariscotta and Clary Lakes and Dyer Long Pond were studied by detailed methods. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction through June 1992.

All or portions of the following flooding sources were studied by approximate methods: Three Corner Pond, Kerr Pond, Flood Pond, Pitcher Brook, Black Brook, Davis Stream, Travel Pond, Travel Brook, Sheepscot River, Brann Brook, West Branch Stream, Dyer River, Little Dyer Pond, Musquash Pond, Deer Meadow Pond, Horn Pond, Deer Meadow Brook, and several other unnamed ponds, marshes, and swamps. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the Town of Jefferson.

2.2 Community Description

Jefferson is located twenty miles northeast of Wiscasset. Jefferson is an agricultural and vacation community in the Lincoln County Lake region (Reference 1). Jefferson, in 1980, had a population of 1,616, an increase of 30 percent since 1970 (Reference 2). The land area of the town is 49.5 square miles (Reference 3). This gives a population density of about 33 people per square mile. Jefferson is bounded on the north by the Towns of Windsor, Somerville, and Washington; on the east by the Towns of Waldoboro and Nobleboro; on the south by the Towns of Newcastle and Alna; and on the west by the Town of Whitefield.

Damariscotta Lake is the largest body of fresh water in Lincoln County; it has a surface area of 4,625 acres and a maximum depth of 114 feet. The Damariscotta River flows out of Damariscotta Lake, and has a drainage area of 56.8 square miles at the outlet of the lake. At the outlet of the lake, there is a 40-foot drop to tide water in a distance of 400 feet. Water levels of Damariscotta Lake are controlled by a dam at the outlet of the lake. The lake levels are regulated for multi-purpose usage, including power generation, alewife propogation, recreation and camping, and to help prevent flooding. Damariscotta Lake has the largest alewife run in the state. Alewives are harvested commercially at the outlet.

Dyer Long Pond has a surface area of 392 acres, a maximum depth of 16 feet and a drainage area of 17.5 square miles. Alewives, an anadromous fish, use the pond for spawning. They enter the pond through a fish ladder in the small dam at the outlet.

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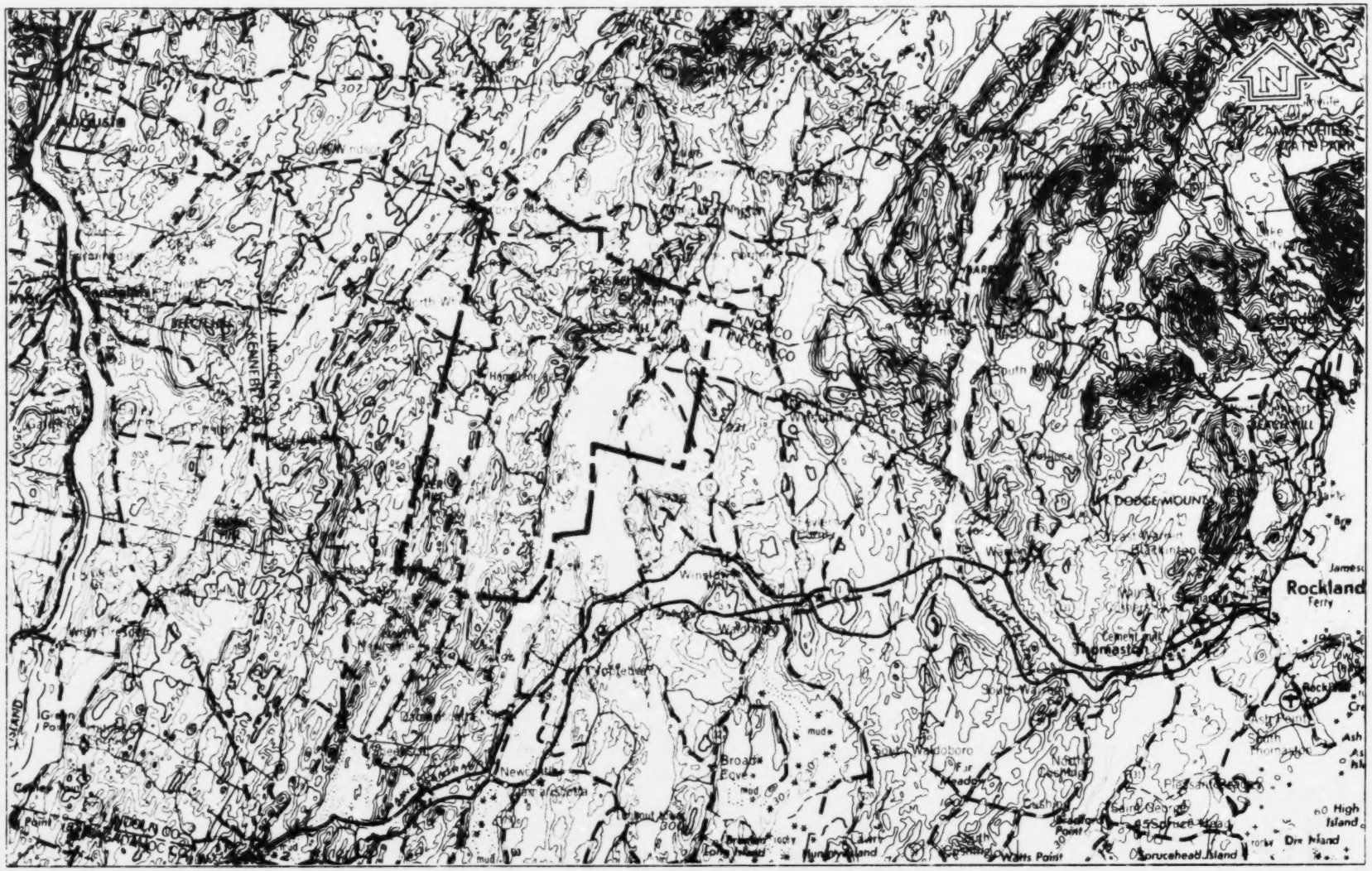

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF JEFFERSON, ME

(LINCOLN CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

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Clary Lake, also known as Pleasant Pond, has a surface area of 682 acres, a maximum depth of 22 feet, and drains 9.56 square miles. In recent years due to the inflow of nutrients, the lake has experienced algae blooms. This has discouraged people from building along its shores.

The climate of Jefferson is typified as humid continental, which means moderately comfortable summers with temperatures averaging 65°F in July and fairly cold winters when temperatures average 21°F in February. The mean annual temperature is about 45°F and the average annual precipitation is about 48 inches, which is distributed uniformly throughout the year (Reference 4).

2.3 Principal Flood Problems

Flooding in Jefferson is limited to Damariscotta and Clary Lakes, and Dyer Long Pond. Flooding generally occurs in the spring months from rapid runoff caused by heavy rains combined with snowmelt and, less frequently, later in the year as a result of hurricanes.

2.4 Flood Protection Measures

The Town of Jefferson has adopted the minimum shoreline zoning ordinance as required by the State of Maine (Reference 5). This ordinance serves to protect the shorelines by restricting building to reduce flood damage and problems.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. A flood event of a magnitude which is expected to be equaled or exceeded once on the average during any 100-year period (recurrence interval) has been selected as having special significance for floodplain management and for flood insurance rates. This event, commonly termed the 100-year flood, has a 1 percent chance of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Analyses were carried out to establish the peak elevation-frequency relationships for each flooding source studied in detail affecting the community.

The principal source of hydrologic data for Damariscotta Lake was the Damariscotta Lake Association who furnished lake water-level records. The water-level readings were adjusted to National Geodetic Vertical Datum (NGVD) values by running levels from a benchmark to the lake gage. The datum of the gage was found to be 46.28 feet (NGVD). The 100-year flood elevation was determined by a log-Pearson Type III distribution of 10 annual maximum lake elevations for the period 1977-1986 (Reference 6).

In order to determine the 100-year flood elevations of Dyer Long Pond and Clary Lake, 100-year discharges at the control dams at the outlets of these lakes were computed. The resultant discharges for the 100-year floods were computed using the equations developed by R. A. Morrill, in Open-File Report No. 75-292 (Reference 7). These equations relate flood flows to the following basin characteristics: drainage area, main channel slope, and storage area in the basin. The 100-year flood discharge at the outlet of Dyer Long Pond is 918 ft^3/s. The 100-year flood discharge of the outlet of Clary Lake is 510 ft^3/s.

The stillwater elevations for the 10-, 50-, 100-, and 500-year floods have been determined for Damariscotta Lake, Clary Lake, and Dyer Long Pond and are summarized in Table 1, "Summary of Elevations."

TABLE 1 - SUMMARY OF ELEVATIONS

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	100-YEAR FLOOD ELEVATION Feet (NGVD)
DAMARISCOTTA LAKE	56.8	57.8
CLARY LAKE	9.56	153.6
DYER LONG POND	17.5	135.4

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

The water-surface elevation for Damariscotta Lake was determined from the log-Pearson Type III frequency distribution of lake levels for the period 1977-86. The water-surface elevations for Clary Lake and Dyer Long Ponds were taken from profiles developed by using a step-backwater computer program model (Reference 8). The starting

water-surface elevations used for the profiles were determined using slope area methods. The slopes of the outlet streams were obtained from computations of elevations and distances as shown on the topographic map of the area. The controls (the outlet dams), the approaches, bridge geometry, and downstream (exit) sections were surveyed and tied into mean sea level datum (NGVD). Roughness values (Manning's "n") were determined by field inspection of the channel and floodplains. The main channel values ranged from 0.033 to 0.040 and floodplains ranged from 0.055 to 0.070 for the Clary Lake Outlet Stream. Roughness values for the Dyer Long Pond Outlet Stream ranged from 0.030 to 0.035 for the main channel and from 0.055 to 0.075 for the floodplain.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail. Effects of ice jams are not considered in this analysis.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the FIRM (Exhibit 1) . The existence and description of all elevation reference marks listed in Exhibit 2 were verified by field inspection.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100-year floodplain boundaries to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. For the bodies of water studied in detail, the 100-year floodplain boundaries have been delineated using the flood elevations determined. The boundaries were interpolated using topographic maps at a scale of 1:24,000 with a contour interval of 20 feet (Reference 9). Shorelines may change from season to season, therefore, caution should be taken when using the shoreline as a landmark or reference point.

For the flooding sources studied by approximate methods, the boundary of the 100-year flood was delineated using the Flood Hazard Boundary Map for the Town of Jefferson (Reference 10).

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 1). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

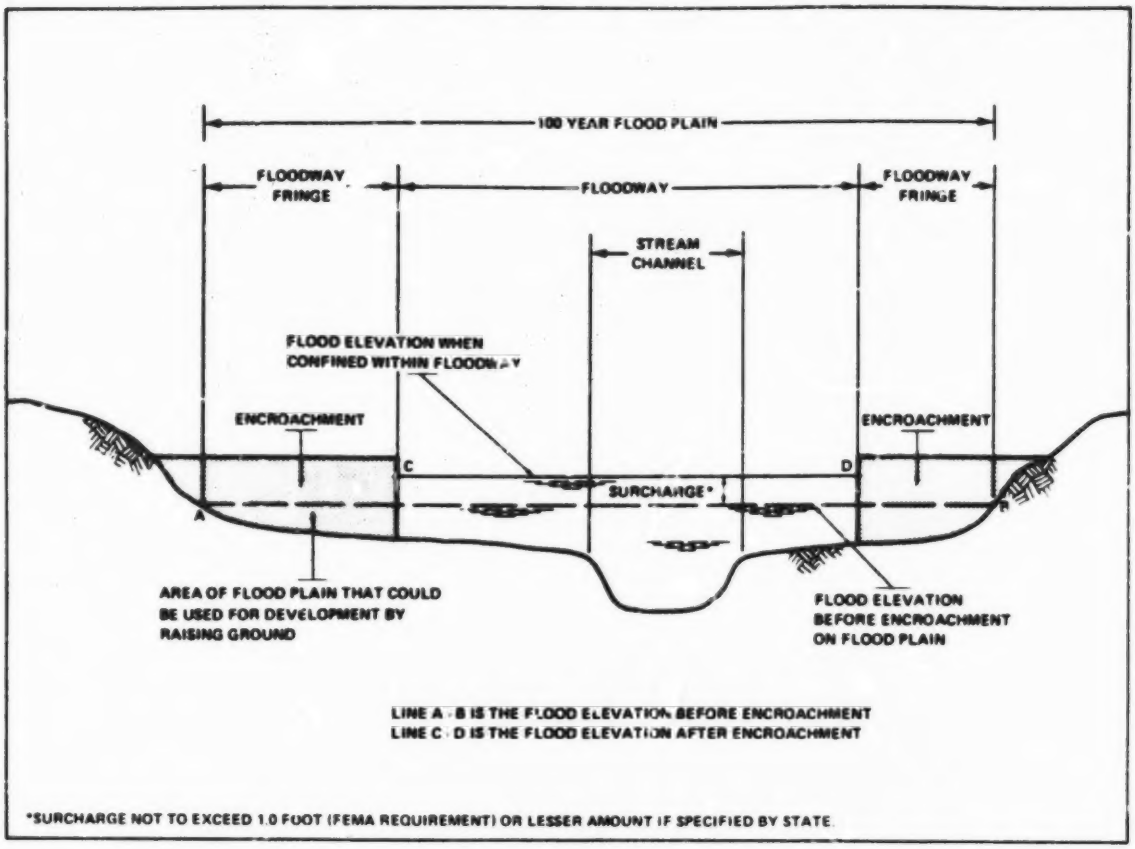
No floodways were calculated as part of this study.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FLOODWAY SCHEMATIC Figure 2

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

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Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100-year floodplain. The locations of selected cross sections used in the hydraulic analyses are shown where applicable.

7.0 OTHER STUDIES

There are no studies known to exist concerning flooding in the Town of Jefferson. Due to its more detailed nature, this study supersedes the Flood Hazard Boundary Map for the Town of Jefferson and should be considered authoritative for the purposes of the National Flood Insurance Program (Reference 10).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, J. W. McCormack Post Office and Courthouse Building, Room 462, Boston, Massachusetts 02109.

9.0 BIBLIOGRAPHY AND REFERENCES

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4. U. S. Department of Commerce, National Oceanic and Atmospheric Administration, Climatological Annual Summary New England, 1984, Volume 96, number 13, Washington, D. C., 1984.

5. State of Maine, Guidelines for Municipal Shoreland Zoning Ordinances, Augusta, Maine, December 15, 1973.

6. U. S. Department of the Interior, Geological Survey, Office of Water Data Collection, Interagency Advisory Committee on Water Data, "Guidelines for Determining Flood Flow Frequency," Bulletin 17B, Reston, Virginia, Revised September 1981.

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8. Federal Highway Administration, Report FHWA/RD-86/, 117 p., Bridge Waterways Analysis Model/Research Report, by James O. Shearman and others, Washington, D. C., 1986.

9. U. S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 20 Feet: Damariscotta, 1970, Waldoboro West, 1965.

10. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Jefferson, Lincoln County, Maine, October 25, 1974 (Revised 7/9/76).

EXHIBIT 2 - ELEVATION REFERENCE MARKS

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 1	10	175.046	Top of standard USGS bronze tablet stamped TT 69 HO 1940 and set on top of large granite boulder, 4.7 miles northwest of post office in Jefferson Village along State Route 126, 60 feet south of highway and 40 feet west of intersection of Mountain Road.
RM 2	10	175.697	Top of standard USGS bronze tablet stamped T 28 1941 and set on top of large embedded boulder, 1.5 miles northeast of Jefferson Grange Hall along Hinks Road to camp road leading to Dyer Long Pond. Tablet is 240 feet southeast of Hinks Road and 55 feet north of camp road. Top of boulder is approximately 3 feet above ground level in wooded area.
RM 3	10	134.37	Top of 1-foot by 1-inch diameter iron pin set on top of rock and concrete abutment on northwest side of outlet of bridge at outlet of Dyer Long Pond.
RM 4	10	62.981	Top of Maine Department of Transportation standard tablet stamped 2378, top of concrete wall on northeast side of State Highway 32 bridge over inlet to Damariscotta Lake.
RM 5	10	206.121	Top of standard USGS bronze tablet stamped 2 RAK 1963 set on top of large boulder alongside Linscott Road in Jefferson 0.95 mile southwest of intersection of State Highway 32 and Linscott Road, 45 feet east of centerline of road and 32 feet southwest of southwest corner of large barn.
RM 6	20	198.681	Top of standard bronze tablet stamped T 27 1941 set in large rock ledge, 0.8 mile south of South Jefferson Grange Hall along State Highway 215 at South Jefferson, 200 feet northeast of intersection of State Highway 215 and road leading east, 20 feet northwest of highway, and 10 feet above surface of the road.

EXHIBIT 2 - ELEVATION REFERENCE MARKS (continued)

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 7*	Not Shown	153.56	Top of threads of most downstream 3/4-inch bent iron bolt. Bolt is set in center concrete portion of north spillway wall of Chase Dam. Dam is at outlet of Clary Pond at North Whitefield.

*Outside study area